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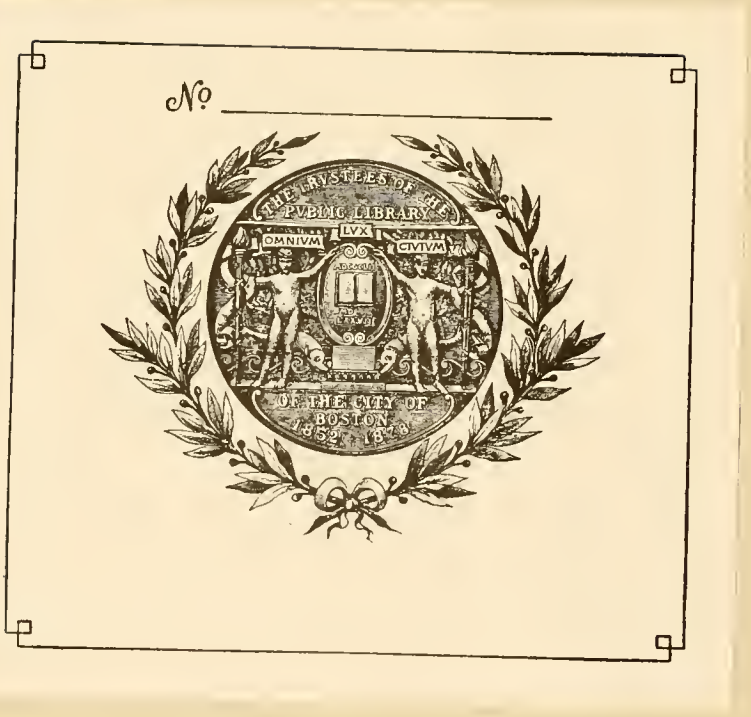
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U.S. Work Projects Administration

SURVEY OF TRAFFIC OBSTRUCTIONS

TECHNIQUE FOR LOCATING AND RECORDING OBSTRUCTIONS TO VEHICULAR AND PEDESTRIAN TRAFFIC, WITH SUGGESTIONS FOR MAKING IMPROVEMENTS

W. P. A. Technical Series
Research and Records Projects Circular No. 1

September 4, 1939

FEDERAL WORKS AGENCY
WORK PROJECTS ADMINISTRATION
Division of Professional and Service Projects
Washington, D. C.

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Technique for compiling data indicating traffic hazards and protection to children walking to and from school and mapping the safest routes to travel, with guiding principles for selecting the safest routes.

(Continued on inside of back cover)

FOREWORD

This circular provides a suggested operating technique for determining the location and nature of obstructions to vehicular and pedestrian traffic in cities and towns.

The procedure presented herein is not mandatory. Local conditions and special requirements may necessitate some changes. It is believed, however, that this procedure is adequate to accomplish the desired objective of such a project.

This procedure relates only to the technique of project operation. Nothing in this circular is to be construed as affecting or modifying in any way administrative procedures of the Work Projects Administration.

F. C. Harrington
Commissioner of Work Projects

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PREFACE

Motor vehicle collisions with fixed objects are reported by the National Safety Council to have been the cause of 3,750 deaths and 95,000 injuries during 1937. Deaths from this cause have increased 244 per cent since 1927. These figures include the results of collisions with objects that are not obstructions in the roadway. They do not, however, include the results of accidents in which obstructions, though not struck, were contributing factors. It is difficult to estimate the full extent to which improperly located and unmarked obstructions in and near the roadway are responsible for accidents. However, the problem is significant enough to warrant attention leading to possible improvement of the situation.

Every motorist and pedestrian has a right to expect that his path is free from unnecessary obstructions, and that such obstructions as are necessary in the roadway are properly located and marked so that he is adequately warned of their presence. Bridge columns, raised streetcar loading zones, street offsets and dead ends, signals and signs in the roadway, etc. that are inadequately marked constitute hazards that often are responsible for traffic accidents. Furthermore, some obstructions, whether marked or not, seriously inconvenience vehicles and pedestrians.

Motorists and pedestrians, though irked by obstructions that interfere with their normal movements, as a general rule are not inclined to report such obstructions to the proper local authorities. For this reason it appears desirable for a community to

make a survey of its entire street system for the purpose of bringing to light obstructions that interfere with the safe and convenient movement of vehicles and pedestrians. This circular, therefore, offers a detailed procedure for conducting such a survey of obstructions, together with practical suggestions for making improvements.

In releasing this circular it is assumed that the project will be supervised by a person who is technically qualified to develop additional details that may be necessary in adapting the procedure to local conditions and special situations, to determine the specific duties each worker is best qualified to perform, to analyze the data collected, and to make recommendations. If this procedure is not applicable in a specific situation or is not acceptable to the sponsor, substitute forms and instructions for their use and descriptions of methods should be submitted with the project application.

Though the WPA provides assistance by making workers available for projects, responsibility for the conduct of this project rests with the sponsor.

The material in this circular has been prepared by the Division of Professional and Service Projects, Work Projects Administration, Washington, D. C. Appreciation is expressed for the many helpful criticisms and suggestions made by Burton W. Marsh, Director of Safety and Traffic Engineering of the American Automobile Association; Robert A. Mitchell, Traffic Engineer, City of Philadelphia, Pa.; and Donald M. McNeil, Traffic Engineer, City of Pittsburgh, Pa., in their review of the first draft of the circular.

NATURE OF PROJECT

A. Objective

The object of this project is to survey the streets and intersections of a community to determine systematically the location and nature of obstructions in the paths of travel of vehicles and pedestrians. The project should result in a report that summarizes the findings and makes specific, practical recommendations for removal, relocation, illumination, marking, sign-posting, or other treatment of obstructions.

The recommendations for improvement should be spotted on maps, as illustrated in Figure 4, page 38. Detailed drawings, as shown in Figure 3, page 35, should be prepared for the more involved situations and for those requiring unusual treatment.

The completed summaries, maps, and detailed drawings of recommendations should be grouped according to the local agency that will perform the required work. For example, in most cases the highway department would cut back corner curbs, construct safety islands, repair streets, etc., the bureau of utilities would arrange for the relocation of utility poles, the U. S. Postoffice Department would relocate mailboxes, the traffic bureau would paint roadway markings, install and relocate signals and signs, etc. Each agency should be furnished with sufficiently detailed instructions to enable it to carry out its part of the program of treating obstructions for increased safety and convenience. The agency sponsoring this project should discuss the objective of the project with the groups

concerned with or interested in the problem, invite their cooperation, coordinate the various related activities, and assume active responsibility for having all of the recommendations put into effect.

B. Types of Information Obtained and Their Uses

The general types of information that are collected, compiled, and given consideration in this project are the location, nature, description, and dimensions of all obstructions that interfere with efficient and safe movement of vehicles and pedestrians. Similar information is also obtained on all highway structures and equipment, located near the obstructions, that are likely to be involved in recommended measures for improvement.

Specifically, the obstructions include bridge support columns, end posts of narrow bridges, utility poles, safety islands, pedestal type stop-and-go signals and flashing beacons, signs on stanchions, raised guide buttons (so-called mushroom buttons), corner curbs of short radius, and offsets in curb alignment. Also included are obstructions that primarily concern pedestrians. These are newspaper and magazine stands, waste receptacles, mailboxes, fire alarm, traffic control, and police call boxes, and unusually high sidewalk curbs and safety islands (which encourage pedestrians to avoid the islands).

The information collected will indicate the locations where attention is needed and will provide a sound, factual basis for making specific recommendations for improvement.

C. Sponsors

The preferred sponsor for this type of project should logically be the city traffic engineer, for he is primarily concerned with convenient, efficient, and safe use of the streets. If the city does not have a traffic engineer, the engineering agency that assumes the major responsibility for traffic control and safety should sponsor the project. This may be the bureau of streets, the department of public works, the city planning department, or the office of the city engineer, to suggest a few of the more likely agencies. In some cases, where it is responsible for all traffic work and is adequately staffed to do engineering work, the police department may be the desirable sponsor.

In some communities it may be desirable for the sponsor to secure the active cooperation and participation of the local transit company engineers and traffic safety representatives of the local automobile club or safety council. Such cooperation may be especially desirable in training the survey personnel to recognize traffic obstructions.

D. Information Needed for Project Initiation

1. Personnel. The sponsor should provide a technical supervisor who is to guide the work of the project, advise the WPA supervisor in matters relating to the operation of the project, and assume responsibility for the interpretation of the data, the making of recommendations, and the writing of the report. It is preferable that an engineer be selected for this assignment. He should have administrative

ability and practical experience in street and highway safety work. The supervisor furnished by the WPA (for the duration of the survey) should have administrative ability and some engineering or traffic survey experience.

Clerks, typists, and persons with drafting ability will be required. The clerks will prepare lists, make field observations, check field work against assignments, and summarize data. The typists will cut stencils, prepare lists, and type the final report. The draftsmen will cut special stencils, prepare maps, spot obstructions and recommendations on maps, and make detailed drawings showing the recommended treatment of obstructions.

The estimated man-hour requirements for a typical residential district--with its shopping center--embracing an area including approximately 100 intersections (blocks 300 to 400 feet long, with few irregular intersections) is as follows:

Draftsmen	300 man-hours
Field Clerks	280 man-hours
Office Clerks	120 man-hours
Typists	54 man-hours

The above estimates are intended only as a guide. They must be increased or decreased, depending on the type of district, number of irregular or complicated intersections, block lengths, and the availability of suitable street layout maps. The personnel requirements should be computed on the basis of a project operation not exceeding six months.

2. Materials and equipment. The sponsor will ordinarily be responsible for providing the necessary materials and equipment. Quantities of forms, lead pencils, erasers, spring clamps and boards (for holding field forms), mimeograph paper and ink, stencils, and tracing cloth or paper are required. The field men will need tape measures. Draftsmen will need drawing instruments, T square, triangles, protractors, scales, India ink, drawing and colored pencils, art gum, thumb tacks, etc. Additional requirements are typewriters, drawing boards, a mimeograph machine, desks, tables, benches, and chairs, together with facilities for storing and filing records, maps, etc. Working space also will have to be provided.

INSTRUCTIONS TO PROJECT SUPERVISORS

A. Sources of Information

Practically all the information relating to the location and nature of obstructions will have to be obtained through actual observation in the field. Below are listed items of information useful in this project and some of the sources where they might be found.

SOURCES OF INFORMATION

	Information	Likely Sources
1.	Street plan, roadway widths curb and building lines, and alignment details.	Highway Department, city engineer's office, assessor's office, bureau of surveys, the traffic engineer, and the city street directory map.
2.	Locations, types, and general dimensions of safety zones and channelizing and loading islands.	Traffic engineer, highway department, city engineer's office, and local railway company.
3.	Recommended standard practices relating to treatment of obstructions and design and location of signs, signals, and markings.	"Manual on Uniform Traffic Control Devices," by National Conference on Street and Highway Safety. Available from U. S. Bureau of Public Roads, Washington, D. C.

A suitable street layout map covering the entire city or several maps covering different sections of the city often are available or usually can be made from existing maps of the street system. These will be needed for spotting the location of obstructions and the recommendations. Inquire at all city departments for street maps that are drawn to a scale suitable for this project. If such maps

are available the problem then becomes a simple matter of tracing, involving no drawing layout work. If no suitable street layout maps are available it will be necessary to obtain detailed information on street widths, block lengths, etc. from the highway department street section maps or from plat books in that department, the city engineer's office, or the city assessor's office.

Roadway widths, curb and building lines, and street curb alignment details—all necessary in the preparation of large-detail drawings for showing obstructions and recommendations at certain locations—may also be obtained from the plat books and section maps mentioned above.

B. General Organization of the Work

A summary of the procedural steps for this project is given on page 10.

It is advisable to divide the city into several districts of approximately 100 intersections each (one, two, or three of which include the entire central business district) and to schedule field work first in the less-populous, less-congested districts. Wards or census tracts in some cases may be found to be convenient units of division. The districts should be assigned to field crews of two persons each. This plan of operation assures complete and adequate coverage, fixes responsibility, and permits easy checking of results.

The survey of the central business district should be undertaken only after the survey personnel has had the benefit of training and experience in other districts of the city.

C. Training Personnel

Field workers should receive adequate training not only in the proper manner of filling out forms, making sketches, and describing obstructions, but also in how to recognize obstructions to traffic—especially to pedestrians—and in how to make intelligent and thorough observations. Training should consist of classroom instruction and practice sessions in the field. The office workers should be required to attend the classroom sessions of instruction of field workers. All workers are to be thoroughly drilled in the meaning and use of symbols (page 15) on field forms and detailed drawings of recommendations. As part of their training the first regular assignment efforts of the field crews should be thoroughly reviewed and discussed in conference with the persons concerned.

The office workers should be given adequate instructions in the ultimate objective of the project. They (especially the draftsmen) should be thoroughly familiar with all the suggested methods for treating obstructions as outlined on pages 22 to 34.

Draftsmen should be instructed in when and how to make detailed drawings (Figure 3, page 35) of the location and nature of obstructions and of recommended treatment.

Before actually starting work on the project, the key survey workers should be required to study the "Manual on Uniform Traffic Control Devices" (see footnote on page 24) and give special attention to those parts which deal with the location of equipment. The workers will thus be better trained to recognize obstructions and to suggest recommendations for improvement.

D. Making Recommendations for Improvement

It must be made clear to members of the project staff that all recommendations are to be regarded as merely suggestive and tentative and cannot be incorporated in any manner in the final report until reviewed and approved by the sponsor's supervisor.

E. Writing the Report

A final report is to be prepared with the assistance of the project staff. This report, which is to be prepared under the direction of the sponsor's supervisor, will consist largely of material already developed on the project--summary of recommendations, spot map of obstructions and recommendations, and detailed drawings of locations requiring unusual or involved treatment.

F. What to do With the Reports

The disposition of the final reports is clearly a responsibility that belongs to the sponsor, and under no circumstances is disposition to be made by the project staff.

DETAILED INSTRUCTIONS
(for use of the survey staff)

A. Summary of Procedural Steps

The detailed instructions for the operation of this project are divided into eight steps of procedure, as follows:

1. Preparing a street layout map.
2. Obtaining field data.
3. Checking field data.
4. Making recommendations.
5. Preparing detailed drawings of recommendations.
6. Preparing a summary of recommendations.
7. Mapping obstructions and recommendations.
8. Writing the report.

These steps are fully described in the succeeding pages. In general they are to be taken in the order indicated. Completion of or substantial progress in step 1 should prove helpful in scheduling the work involved in step 2. With the possible exception of step 1 it will not be necessary to complete each step before undertaking the next in order. As rapidly as field data for different locations are brought into the office, the data can be checked, recommendations made, detailed drawings prepared, recommendations summarized, and obstructions and recommendations mapped. In other words, steps 2 to 7 can be undertaken at practically the same time. Plans for undertaking step 8 should be developed early in the project, and the actual writing of the report should be carried on as work on the project progresses, so that the report may be completed with a minimum of delay after the last units of field work are completed.

B. Preparing a Street Layout Map

A street layout map should be prepared by the method that is found to be the most practical and convenient for local conditions. Some of the more common methods, arranged in order of preference, are as follows:

1. Utilizing an existing tracing of a suitable street map to make a black- or brown-line print on thin paper. Blueprints can easily be made from such prepared maps.
2. Making a tracing of an existing printed street map that is of a suitable scale.
3. Redrawing to a suitable scale an existing printed street map that is not of a suitable scale, and then making a tracing.
4. Preparing an entirely new street map on drawing paper, based on plat book data and information obtained from the highway department, city engineer's office, city surveyor's office, and the city assessor's office, and then making a tracing.

The scale of the map should be such as to permit the recording of obstructions and recommendations in a simple manner (Figure 4, page 38). Unnecessary details or embellishments should be avoided. A scale of 400 feet to the inch appears to be suitable, but other scales may be used if found satisfactory. For convenience of handling,

the finished map should not be much larger than 24" x 36". Space must be provided on the map for a title (including name of sponsor, city, and project number), symbols, and explanatory notes.

In most cases the project will cover a large area, and it will be necessary to divide the city into sections and make a street map for each section.

C. Obtaining Field Data

The city is to be divided into several districts of convenient size (for example, approximately 100 intersections, if the blocks are not too long). A field crew of two—a recorder and an observer (who handles the tape measure and assists the recorder)—is to be assigned a district. The exact route that the crew is to follow is to be carefully planned and outlined on a map of the district. One copy of the map is to be given to the field crew for its guidance and one copy is to be kept in the office for scheduling and checking purposes. Each intersection and block should be checked off the field crew's district map as soon as the field work is completed. A daily report should be made to the office listing the intersections and blocks that were observed and indicating those for which field forms were prepared. (Field forms are not required for intersections and blocks where no obstructions were observed.) Such a plan of operation eliminates overlapping and double-tracking and serves to assure the field crew and the office that all the intersections and blocks in the district are being covered.

Field form TO-1 (page 14) is used exclusively for recording all information observed in the field. This form is designed primarily for intersections, where most obstructions are found, but provides also for sketching and recording obstructions observed on the street between intersections. For irregular intersections and special situations it will be necessary to prepare, in advance of the field work, special field forms to suit each particular location. It may be desirable to supplement field form TO-1 with a one-page questionnaire that embodies such points as are not specifically or completely provided for on field form TO-1, or that need further clarification or that can be handled to better advantage in question form. Such a questionnaire would also serve as a partial check list for the field workers.

The field workers will be concerned with all constructions, structures, equipment, etc. that are covered by one or more of the following descriptions:

1. Located in the roadway and extends more than 1/2 inch above the roadway surface (this does not include ruts, bumps, and other surface irregularities).
2. Extends (at a level of less than 14 feet, 6 inches) over any part of the roadway on which vehicles can travel.
3. Interferes with or inconveniences vehicles or pedestrians (including pedestrians on the sidewalk in their normal path of travel at intersections).

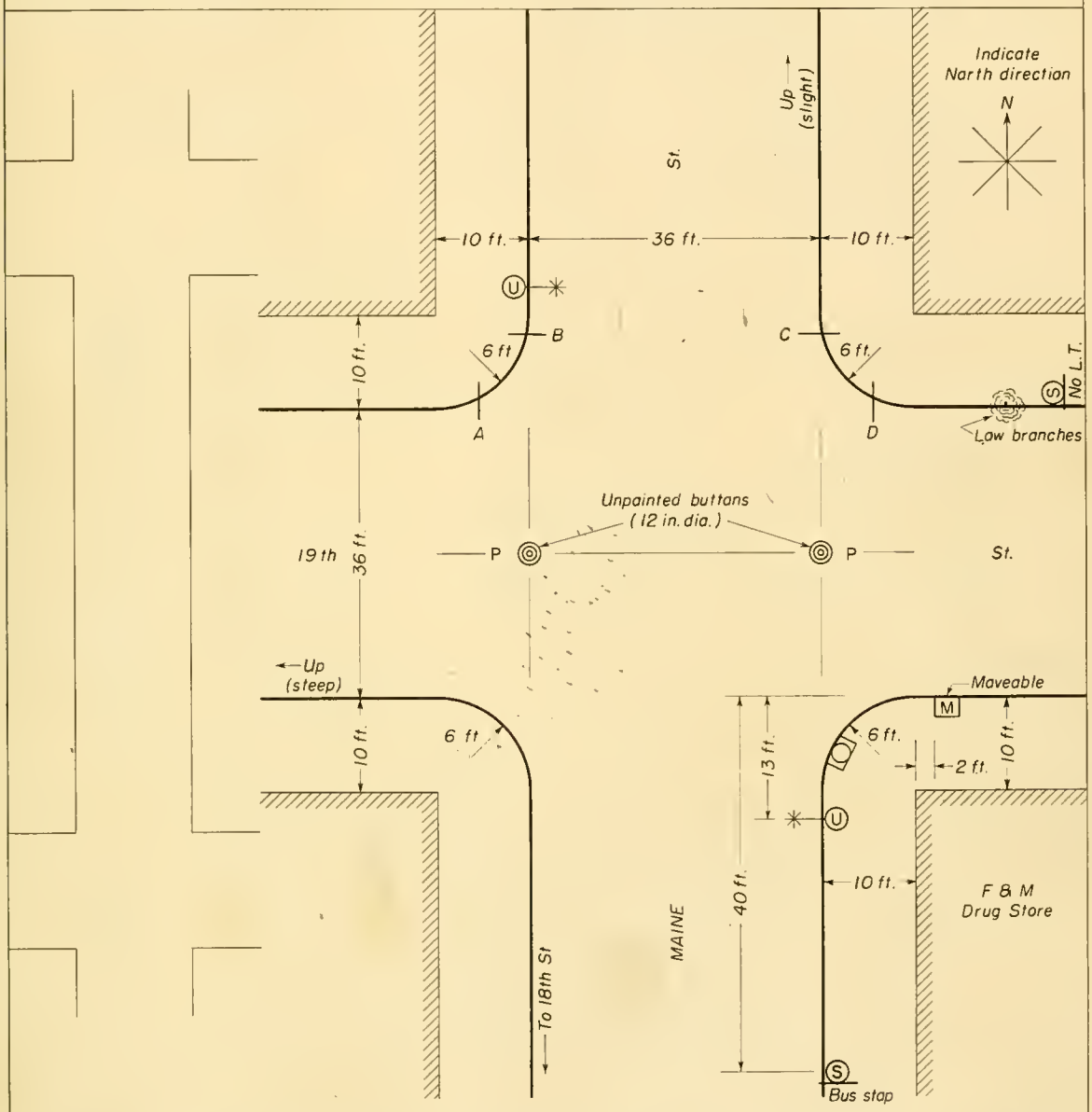
SURVEY OF TRAFFIC OBSTRUCTIONS

Form TO-1

FIELD NOTES

Location 19th & Maine Sts.

Observed by Meneen Date Feb. 16, 1939 Time 3 P.M.



Remarks: Mushroom button at east crosswalk is not securely fastened. Curb heights: A & B, 12 inches; C & D, 11 inches; SE corner curb badly worn and sewer inlet damaged. Right turns at SE corner foul other lanes (especially N-bound on Maine). Route No. 28 bus turns right at SE corner. Both streets asphalt paved. Tree on 19th St., NE corner, has low branches that touch passing trucks.

Suggest removing mushroom buttons, trimming of tree on NE corner, and increasing corner curb radius at SE corner.

Additional information on reverse side of this sheet

☐ Yes ☒ No

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Form TO-2

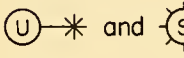
SURVEY OF TRAFFIC OBSTRUCTIONS

SYMBOLS

FOR FIELD SKETCHES AND DETAILED DRAWINGS OF RECOMMENDATIONS

Pole or post (U = Utility; S = Special for the indicated use).

Boxes, stands, etc. – F = Fire alarm box. T = Traffic signal controller. M = Mailbox P = Police call box. W = Waste box N = Newsstand

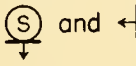


– Street light.

Traffic sign on pole or post.

Traffic sign on stanchion.

} Main wording indicated.



– Stop-and-Go signal on pole or post

Stop-and-Go signal: P = Pedestal in roadway. O = Suspended over roadway.

} Arrows indicate direction of faces.

Flashing beacon: P = Pedestal in roadway; O = Suspended over roadway.

Cellar doors in sidewalk.

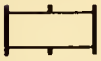
Elevator in sidewalk.

Roadway marking (painted).

Roadway marking (permanent buttons or markers).

Mushroom button (large). P = Plain; R = Reflector; I = Illuminated.

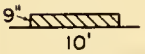
Safety island (if possible, show actual shape).



Bridge or overpass – with position of supports shown.

Railroad.

Tree.



Driveway slope or riser projecting into roadway (give dimensions).

Sewer inlet.

4. Constitutes, under the existing conditions, a hazard to vehicles or pedestrians.

Specifically, some of the more common and obvious obstructions to be considered in the field are as follows:

1. Bridge support columns
2. End posts of narrow bridges
3. Pedestrian islands
4. Traffic islands
5. Streetcar or bus passenger loading islands
6. Offsets in curb alignment
7. Street ends
8. Short corner curb radii
9. Open drains across roadways
10. Pedestal type stop-and-go signals and flashing beacons
11. Signs on stanchions
12. Large mushroom guide buttons
13. Utility poles
14. Driveway curb risers
15. Hand semaphores
16. Traffic officers' platforms or booths
17. Overhanging tree branches
18. Fire alarm, traffic control, and police boxes.
19. Mailboxes
20. Waste receptacles
21. Newspaper and magazine stands
22. Subway and elevated entrances and exits
23. Unusually high curbs where pedestrians cross
24. High crosswalk markers
25. Unusually rough condition of crosswalks
26. Streetcar and bus stops encroaching on crosswalks
27. Cellar doors
28. Sidewalk elevators
29. Merchandise on sidewalk
30. Hawker stands

The nature, present purpose, observed effect on vehicular and pedestrian traffic, over-all dimensions, and the exact location of all obstructions are to be clearly and fully described on field form TO-1. Also to be recorded are the nature, dimensions, and location of all structures (including manholes), equipment, etc. that are

likely to be involved in recommended measures for improvement. For example, if a much-scuffed or damaged corner curb is likely to be recommended for cutting back (increasing the radius), all the physical characteristics of that particular corner of the intersection are to be recorded on the field form. The UP grades of all streets are to be indicated — in approximate percentages if possible, otherwise by such terms as "slight," "steep," "very steep," etc. The directions of one-way streets are to be indicated. The reverse side of the form should be used freely for additional explanations, remarks, and sketches. If necessary, additional copies of the field form (or plain sheets) may be used for this purpose. They must be identified and numbered, and all copies relating to a particular location are to be securely fastened together.

Form TO-2, page 15, shows the symbols that are to be used on field sketches for indicating the various structures and equipment. This list of symbols must be carried on the person of field workers at all times and referred to frequently to insure proper use of symbols in sketching details. In some cases where symbols may not serve the purpose, it may be necessary to make freehand sketches of the obstructions, structures, equipment, etc.

The names and addresses of owners or persons responsible for obstructions that are not the property of the city are to be obtained and recorded on the field form. This applies especially to cellar doors, sidewalk elevators, hawker stands, newspaper and magazine stands, and merchandise on sidewalks.

The minimum clearance distance between the roadway and struc-

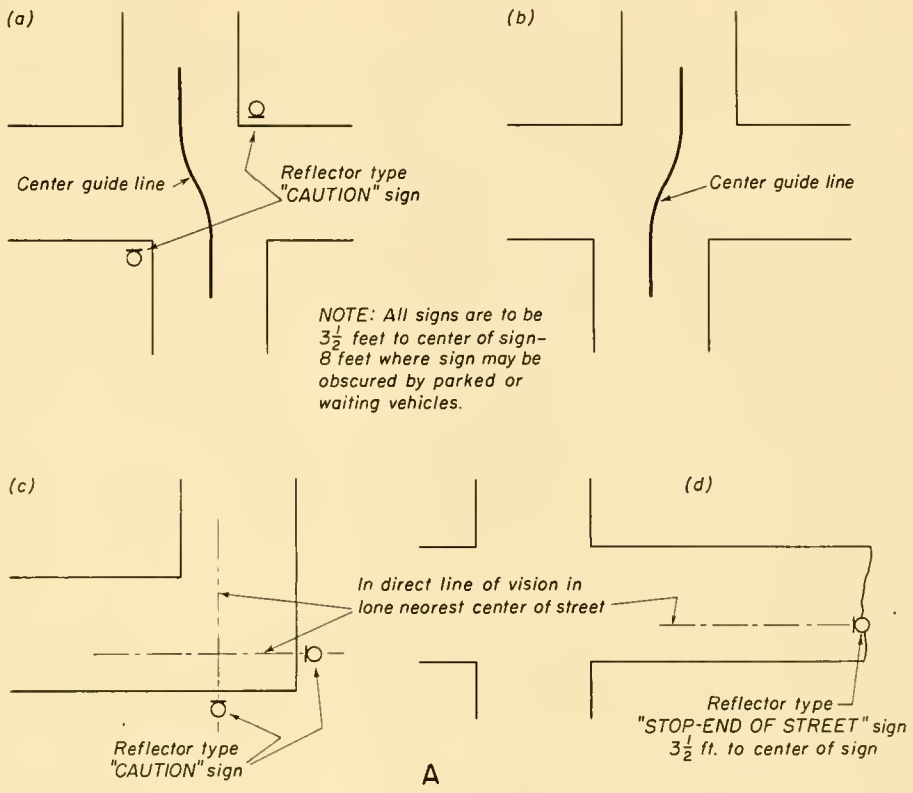
tures, equipment, etc. that extend over or span roadways are to be determined and recorded on the field form.

The field observers are to remain at each corner of the intersection for a period of time sufficient to properly observe whether right-turning vehicles are actually interfering with other traffic lanes or running into or over the corner curb (which also may be evident from the scuffed or damaged condition of the corner curb). See Figure 1-B, page 19. Where such obstructions and interferences are in evidence, the radius of the corner curb is to be measured and recorded on the intersection diagram of field form TO-1.

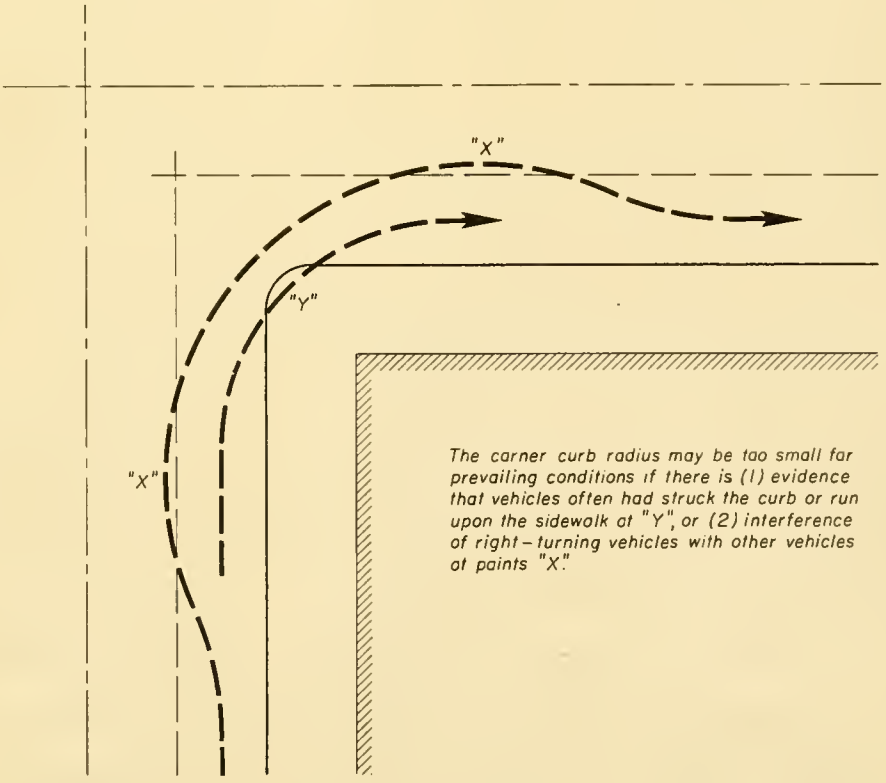
Offsets in curb alignment (Figure 1-A, page 19) and street ends are to be observed and recorded. Details of structures, equipment, etc. within the areas where reflector signs may be recommended to be installed are to be obtained and recorded. This applies to situations typified by examples (a), (c), and (d) shown in Figure 1-A.

Open drains across roadways, if they cause excessive bouncing of vehicles, are to be recorded. The field form should indicate the location of the sewer inlets or drops into which the open drains flow.

Driveway curb risers (devices and curb constructions for assisting vehicles over curbs) are to be recorded, giving their location (house number or distance from the intersection), length, distance projecting into the roadway and distance projecting above the roadway surface level at the curb line, material out of which constructed,



A


"X"
"Y"
"X"
The corner curb radius may be too small for
prevailing conditions if there is (1) evidence
that vehicles often had struck the curb or run
upon the sidewalk at "Y", or (2) interference
of right-turning vehicles with other vehicles
at points "X".

B

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FIGURE 1

and the purpose they serve (entrance to parking lot, private garage, merchandise loading platform, etc.).

Field observers are actually to cross the streets at every crosswalk and thus observe under actual walking conditions the pedestrian obstructions that may be present. Crosswalks with unusually rough surface conditions are to be recorded on the field form. The field workers are to observe and record whether structures, equipment, poles, boxes, stands, etc. on the sidewalks or in the crosswalks cause pedestrians to crowd into the roadway in a hazardous manner or to take relatively unsafe paths in crossing the streets. Obstructions that interfere with pedestrians' view of vehicular traffic are also to be included.

In general, such pedestrian sidewalk obstructions are to be considered as are located within the intersection area formed by the prolongation of the building lines. At intersections where pedestrian traffic is relatively heavy, especially in the central business district, even those obstructions that are near enough to the intersection to create bottle-necks that result in sidewalk congestion or in pedestrians crowding off the sidewalk, are to be recorded. Among these are cellar doors and sidewalk elevators that are used often during the day and merchandise on the sidewalk, whether on display or in process of shipping. The periods of the day when such obstructions are usually present (where this can be ascertained) should be recorded. Such information often may be obtained from local merchants or residents.

Unusually high curbs (over 10 inches) at points where

pedestrians normally cross the street should be noted on the field form (the measured height should be indicated).

The present condition of painting, sign-posting, illumination, etc. of obstructions should be observed and recorded.

In addition to recording the location, description, and condition of signs that may be affected by possible recommendations for improvement, the field workers are to indicate by means of notes under "remarks" on the field form which of the signs are reflectorized and which are illuminated.

All structures and equipment that are moveable, as, for example, certain types of mailboxes and waste receptacles, and that are likely to be affected by possible recommendations, should be so indicated on the field form.

In the light of their actual field observations and knowledge of specific locations, the field observers should record on the back of the field form their comments concerning the practicability of removing or relocating serious obstructions. However, they must understand clearly that their most important task is to secure all the information possible relating to physical structures that are likely to be involved in the final recommendations for improvement.

Field form TO-1 is to be used also for recording and sketching information relating to obstructions observed on the streets between intersections. A separate field form is to be used for each block and each intersection where obstructions are observed.

D. Checking Field Work

Blueprint copies of the street layout maps should be maintained in the office for checking purposes. The field work completed each day should be checked and marked (preferably in colors) on the map. It is desirable to spot the locations where obstructions were observed and for which field forms were prepared. Thus a visible record of the work done and remaining to be done is made available for checking the progress and completeness of the field work. The same map may also be used for scheduling and checking the office work. The field forms should be received in the office the same day that they are completed by the field crews, and checked to determine whether sufficient information (descriptions, dimensions, locations, etc. of obstructions) has been obtained to provide an adequate basis for making specific, detailed recommendations.

E. Making Recommendations

Under the immediate direction of the sponsor's supervisor, a study is to be made of the field forms for each location where obstructions are reported so that proper corrective measures can be determined. The suggestions for improvement made by the field observers are to be given full consideration. In the more important and complicated situations it may be necessary to visit the locations again. In all cases where such substantial obstructions as bridge support columns, islands, pedestal type signals and flashing beacons, and other fairly large structures are located in the more important roadways, it will be necessary to visit the locations at night to determine whether il-

lumination is needed for the obstructions. Many obstructions, though they may not appear as hazards during the day, may be serious hazards at night, and should be adequately illuminated. However, in most cases the locations will be relatively simple and the field forms will provide sufficient information to permit thorough study without additional field visits.

No suggested improvements are to be regarded as final recommendations until they have been discussed with the sponsor's supervisor and approved by him.

There are too many different situations involving obstructions to permit setting forth in this procedure a complete solution to each. Only the more important suggestions and guides for assisting in arriving at practical recommendations for improvement are presented here.

The staff should constantly keep in mind that the ultimate purpose of the project is to reduce to a minimum the hazards and inconveniences to vehicles and pedestrians that are caused by obstructions.

The recommendations for improvement should seek, insofar as practical considerations permit, the complete removal of obstructions. Where removal is not feasible the recommendations should seek to treat the obstructions in a manner that would at all times adequately warn motorists and pedestrians of the presence of the obstructions. In such cases the recommendations may include painting the obstructions, painting guide lines, installing reflector type signs, illuminating the obstructions, etc. In some cases it may be desirable to relocate obstructions. If removal of an obstruction is both feasible and desirable (as for ex-

ample, bridge support columns in the roadway), but for practical reasons is not immediately possible, then such recommendations for improvement as can be put into effect immediately should be made. The report, however, should list the locations where eventual removal of obstructions is recommended.

The detailed recommendations for painting, sign-posting, and illuminating obstructions, and for the design, location, and installation of signs, signals, islands, and roadway markings are to be in accordance with the provisions of the "Manual on Uniform Traffic Control Devices" 1/. Exceptions may be made, of course, where provisions of the State or local law are at variance with the provisions of this manual.

A discussion of the principal obstructions and possible recommendations for improvement follows.

1. Corner curbs. - The advisability of recommending the cutting back of corner curbs (rebuilding corner curbs by using wider arcs -- in other words, increasing the radii -- to permit vehicles to make right turns with increased safety and convenience) depends largely on the seriousness with which right-turning vehicles interfere with other traffic. For all practical purposes this means that corner curb cutbacks should be considered and recommended only for the more important and heavily traveled intersections. It is suggested that the specific recommendations for corner curb cutbacks be divided into three priority groups

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1/ By the National Conference on Street and Highway Safety and the American Association of State Highway Officials, and approved as an American Standard by the American Standards Association. Single copies may be obtained from the U. S. Bureau of Public Roads, Washington, D. C.

as follows:

a. Locations where corner curb cutbacks are most urgently needed and where action should be taken immediately.

b. Locations where corner curb cutbacks are desirable and where action should be taken in the near future.

c. Locations where corner curb cutbacks are warranted and where action should be taken after the work on groups a and b is completed.

Corner curbs that bear evidence of having been scuffed by the wheels of vehicles or of having been run over often or that are known to have been damaged by turning vehicles should be recommended for cutting back. The relative importance of the locations will determine in which of the three priority groups they should be listed.

Each cutback recommended should permit the wheels of a motor vehicle to clear the curb when the vehicle is making a right turn at a very low speed in a manner appropriate and normal to the particular corner. (Note: consideration should be given to the size of vehicles that turn right at the corner. The inside turning radius of a passenger car may be assumed to be 24 feet; truck 30 feet; and bus 30 to 40 feet.) It is advisable to revisit the location to determine accurately by observation the normal lane use of the streets at the corner. It is not within the scope of this project to consider increasing the radius of corner curbs to such an extent that right turns may be made at relatively high speeds. Such considerations require special study.

Consideration should also be given to how the recommended

cutbacks will affect existing utilities, poles, sewer inlets, electric signs projecting from corner buildings, etc. The cost of the cutbacks and necessary incidental changes should not be excessive.

Each corner curb cutback should be limited to the actual needs of the particular corner. As a general rule the radius of the recommended cutback should not be larger than the width of the wider sidewalk. Exceptions may be made where sidewalks are unusually wide or where the pedestrian volume is small or where adequate sidewalk corner area may be maintained by permissible encroachment on private property. Unnecessarily large corner curb radii place pedestrians at increased disadvantage.

2. Pedestrian obstructions. - These are the structures, equipment, etc. that interfere with safe and convenient movement of pedestrians. Items 18 to 30 listed on page 16, and some of the other listed items, are included in this group. Whether or not an obstruction should be regarded as a hazard or an inconvenience to pedestrians, and therefore warranting removal, relocation, or some kind of treatment, depends in a large measure on the extent to which pedestrians are affected. In the central business district and in neighborhood shopping centers, where there are large numbers of pedestrians, all obstructions should be given the fullest possible consideration to the end that improvements of benefit to pedestrians may be effected. On the other hand, at intersections where there are few pedestrians it would not be practical to make extensive, costly recommendations as, for example, the relocation of a utility pole or police call box located in the normal path of pedestrians. The reasonable benefits to

be expected from possible improvements must always be weighed against the practical considerations of cost and expediency.

At heavy pedestrian intersections, newspaper, magazine, merchandise, and hawker stands, mailboxes, and waste receptacles should be relocated if they seriously interfere with the normal flow of pedestrian traffic, contribute appreciably to the congestion at the corners, obstruct pedestrians' view of vehicles, or cause pedestrians to crowd into the roadway or to take paths of travel outside of the crosswalks. All relocations for sidewalk obstructions should be to points well outside the normal path of pedestrian travel.

Where entrances and exits to subways or elevated stations are so located with respect to the intersection that persons using them cross the street in an unsafe manner at points other than the crosswalks, consideration should be given to the advisability of erecting a short fence or barrier at the curb at such points. Such barriers would compel persons who use these facilities to cross at safer places. The barriers themselves should be properly painted or marked so that pedestrians may not run into them at night, especially in bad weather. In addition, signs should be posted on the barriers directing pedestrians to cross the street at the corner.

Frequently-used cellar doors and sidewalk elevators that are located so near heavy pedestrian intersections that they cause pedestrians to crowd into the roadway or create pedestrian congestion at the corners should be regarded as obstructions. Recommendations should be made that seek to limit their use to the hours when pedestrian traffic is light.

Streetcar and bus stops encroaching on crosswalks should

be moved farther back from the crosswalk.

Crosswalk markers, buttons, or inserts that are too high (over $\frac{1}{2}$ inch) and do not taper off gradually to meet the roadway surface are hazards to pedestrians. It is recognized that recommendations for immediate replacement with better-designed markers may not be practical. However, the report should list locations where better-designed markers should be installed when routine replacements due to wear, damage, etc. are in order. Properly designed buttons or markers should be used in all future crosswalk installations.

The most generally recommended height for curbs at points where pedestrians normally cross is 5 to 7 inches. This has been found to be the most reasonable height because of its convenience and safety for pedestrians (especially for older persons and persons with baby carriages). In many communities the cost entailed in lowering high curbs on an extensive scale would be prohibitive, but if the number of crossing points where the curb height is over 10 inches is significant enough, this fact should be brought out in the report to direct attention to the situation. In some cases of unusually high curbs it may prove to be practicable and desirable to construct "two-step" curbs. In all instances where corner curb radii changes are recommended, consideration should be given to the use of a curb height of 5 to 7 inches. In addition, all future alterations and new installations of corner curbs and of islands for pedestrians and streetcar and bus passengers should have the recommended curb height.

3. Obstructions in the roadway. - Certain obstructions in the roadway serve useful purposes, and by their very nature are indispensable. Removal would be out of the question. In some cases relocation may be possible and desirable. In all cases, however, the obstructions should be properly painted. Reflector type signs should be erected or adequate illumination should be provided at night at specially hazardous obstructions.

Bridge support columns, pedestals of signals and warning beacons, islands, poles, signs on stanchions, and other substantial obstructions in the roadway should be painted with alternate black and white (or black and yellow) diagonal stripes and otherwise treated in the manner suggested in Figure 2 (page 30). End posts of narrow bridges, whether in the roadway or at the curb, should be treated in a similar manner and adequately marked with reflector button units.

Pedestal type signals and warning beacons located in narrow roadways should be replaced by corner post type units. Pedestal type units, located in large area, irregular intersections, that do not help to facilitate the movement of traffic or that constitute hazards in themselves, should be relocated more favorably (as, for example, on traffic islands) or replaced by corner post type units. It is suggested that the locations where conversions from pedestal to corner post type units are recommended be classified to show which should be undertaken first (similar to the plan suggested for corner curb cutbacks on pages 24 and 25).

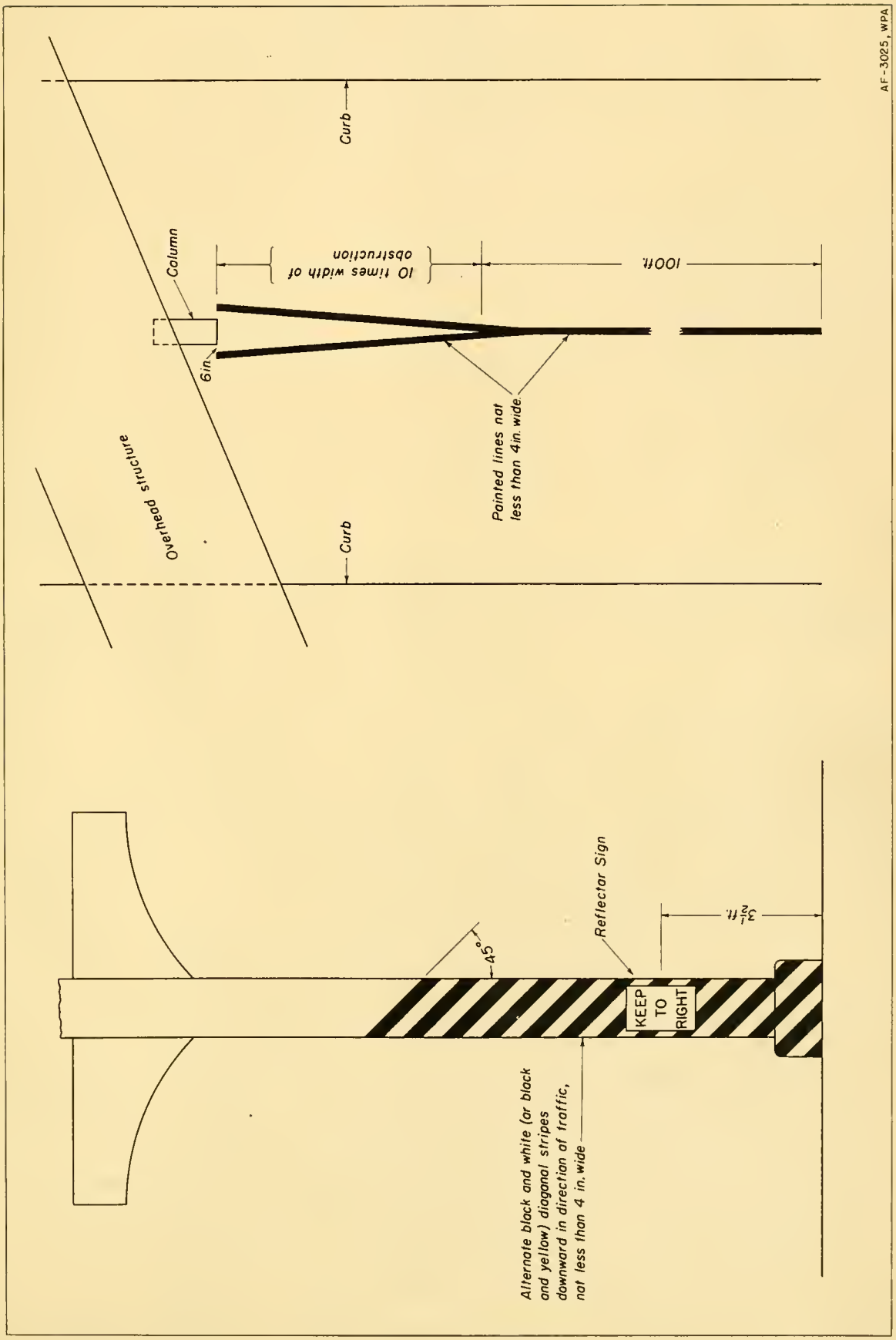

AF-3025, WPA
Curb
Column
10 times width of obstruction
100ft.
6in.
Painted lines not less than 4in. wide
Overhead structure
Curb
Reflector Sign
45°
32½ ft.
KEEP TO RIGHT
Alternate black and white (or black and yellow) diagonal stripes downward in direction of traffic, not less than 4 in. wide
P-69

FIGURE 2

Signals suspended over the roadway by cables or hanging from bracket arms extending over the roadway should have a clearance of at least 14 feet, 6 inches.

Bridges, viaducts, and other structures spanning the roadway, that clear the roadway by less than 14 feet, 6 inches (at the point of least clearance) should have the measured clearance height painted on the structure, conspicuously visible to approaching traffic. In States that have no restrictions on the height of vehicles the clearance height should be painted on all such structures having a clearance height of less than 18 feet.

Signs on stanchions, police hand semaphores, and traffic officer platforms or splash boxes should be so located that they cause the least possible interference to traffic.

Large mushroom guide buttons, whether plain, reflectorized, or illuminated, projecting 2 or more inches above the roadway surface, should not be used at any point where they can interfere with traffic. Where they are necessary they should be painted yellow or white. They should be repainted as frequently as local conditions make it necessary, in order to maintain a high degree of visibility.

Driveway curb risers at entrances to parking lots, garages, loading platforms, etc. should be removed from roadways that carry considerable traffic. At such points, if conditions warrant and official permission is obtained, gradually-sloping driveways should be constructed. Driveway slopes should not project into the roadway.

Such open drains across main roadways as cause excessive bouncing of vehicles should be recommended to be eliminated. The

problem of how best to effect the eliminations should be recommended for study by the agencies responsible for the construction and maintenance of sewers and streets. Future street constructions should avoid the use of open drains across roadways.

Trees with large branches overhanging the roadway should be recommended for trimming if the branches touch passing vehicles or interfere with the driver's view of signals or signs.

A more detailed discussion of recommended standard methods of treating obstructions and of the application, design, and location of islands, signals, signs, and roadway markings is contained in the "Manual on Uniform Traffic Control Devices" (identified in the footnote on page 24). It should be emphasized here that the detailed recommendations issuing from this project should be based on the provisions of this standard manual, insofar as State and local laws permit.

4. Offsets in curb alignment and street ends. - Offsets in curb alignment, depending on their nature, amount of offset, and use of the streets, often may be regarded as delay producers or hazards. Such offsets on streets that carry an appreciable volume of traffic, especially non-local traffic, are hazards at night and to some extent in the daytime. They should be treated with reflector type caution signs and painted center guide lines, as illustrated by sketches (a) and (b) in Figure 1-A, Page 19. The sketches in Figure 1-A illustrate only two typical examples of curb offsets. This survey undoubtedly will be concerned with variations of these, but the treatment should be essentially the same. Where the offset distance exceeds the width of the offset

street, the location may be regarded as two separate, "T" intersections, not requiring the caution sign and center line treatment described above. The "T" intersections, however, may require other kinds of treatment. Offsets of less than two feet may be regarded as slight deflections that do not warrant special treatment. No treatment need be recommended for curb offsets at little-used intersections located in out-of-the-way places and used almost exclusively by local traffic.

For the purpose of preventing pedestrians from crossing at particularly hazardous points, it may be found desirable in some cases to erect barriers at the curb at intersections with offset curb alignments. Such barriers should be properly painted or marked so that pedestrians can easily see them and in addition should be posted with signs directing pedestrians to cross elsewhere at the intersection.

Where much-used streets terminate in a dead end (no outlet), reflector type "STOP - END OF STREET" signs should be posted as suggested by sketch (d) in Figure 1-A. Such treatment should be given to dead ends of streets that carry an appreciable volume of traffic to within three blocks of the dead end. The need for sign-posting dead ends of streets that are much used by non-local or out-of-town traffic is particularly imperative.

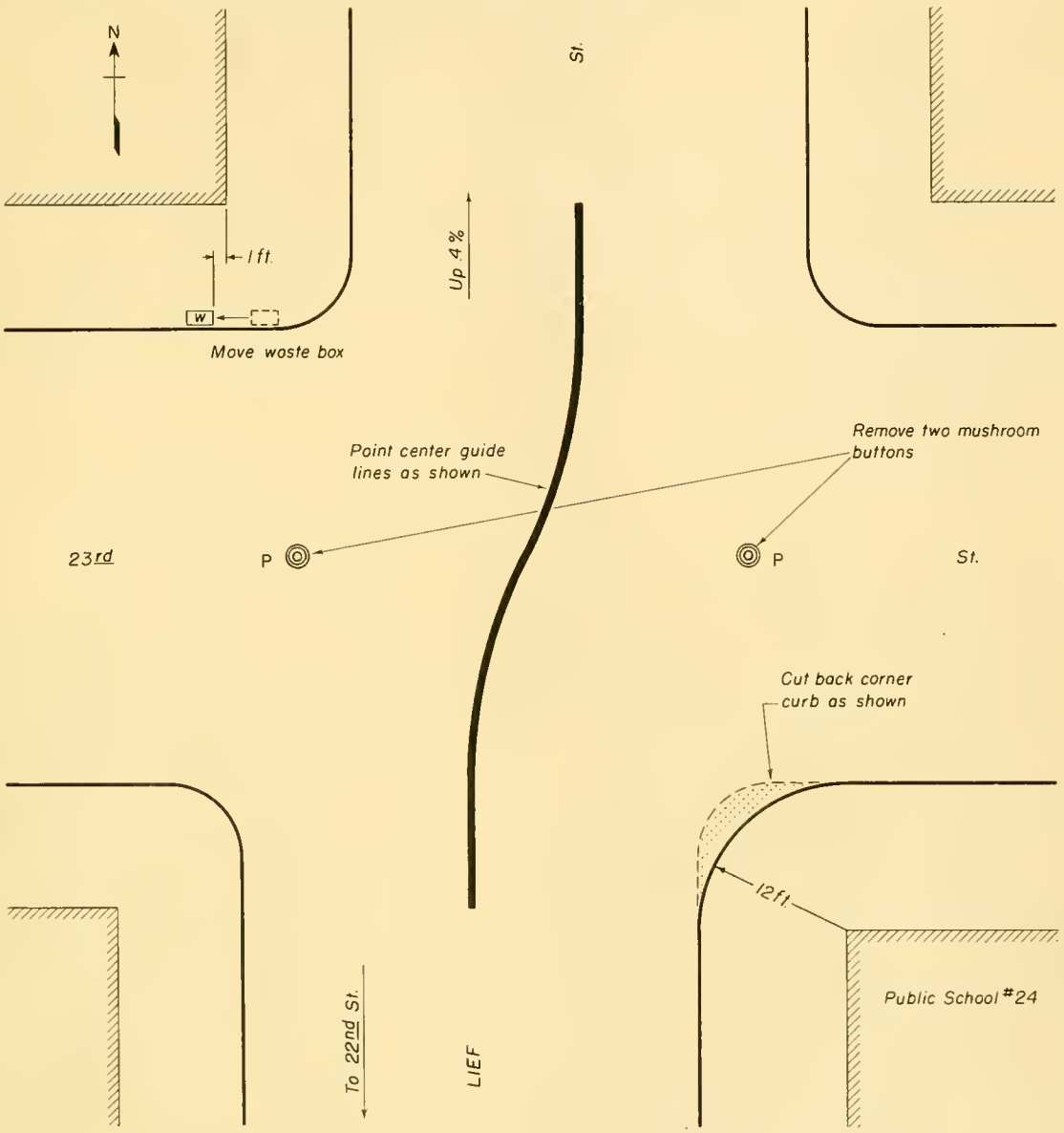
Streets that have sharp right-angle turns and that carry an appreciable volume of traffic should be treated in the manner shown in (c) of Figure 1-A. Where there is heavy traffic, it may be advisable to paint a center line at the turn to help keep opposing streams of traffic separated.

All stop, caution, and warning signs should ordinarily be erected at a height of 3½ feet from the pavement to the center of the sign. At locations, especially in the business and built-up residential districts, where the signs are likely to be obscured by parked vehicles, they should be erected at a height of 8 feet.

F. Preparing Detailed Drawings of Recommendations

Detailed drawings (illustrated in Figure 3, page 35) should be prepared with pencil on tracing paper for locations where recommendations are made for the relocation of obstructions or where recommendations are made which cannot easily and clearly be described in the text of the report, in the "Summary of Recommendations" form, or on the maps of obstructions and recommendations. If it is found more convenient, several locations may be put on a large drawing, in which case each location should be numbered for the purpose of identification on the "Location of Obstructions" map (Figure 4, page 38) and the "Summary of Recommendations" Form, TO-3 (page 37). Street widths, curb alignments, and grades needed for preparing detailed drawings may be obtained in most cases from plat books or highway department street maps. Drawings should not be prepared for locations where simple recommendations are made that can be adequately described in the "Summary of Recommendations."

The drawings are to show clearly and accurately (with dimensions) the details of the work that is to be performed in putting the recommended improvements into effect. They are to be titled and numbered for the purposes of identification and reference in connection with spotting the obstructions and recommendations on the street layout map (Figure 4). A map scale of 10 feet to the inch should prove suitable in most cases.



SURVEY OF TRAFFIC OBSTRUCTIONS

RECOMMENDATIONS

23rd & LIEF STS.

March 6, 1939 Scale 1 in.=10 ft.

WPA Project No. 65421

LOCATION No. 6

AF-3026, WPA

P-69

FIGURE 3

G. Preparing a Summary of Recommendations

Summary of Recommendations Form, TO-3 (page 37), summarizes the recommendations for each location and permits convenient grouping of all the recommendations on the project according to the agencies that will do the work involved in putting the recommendations into effect. The column headings of Form TO-3 as illustrated provide only for some of the more common types of recommendations. Local conditions may warrant the omission of some and the addition of others. Footnotes may be used to further describe the column headings.

For reference convenience the locations should be entered in alphabetical order. An "X" is to be placed in each column that describes a recommendation made for improvement of the location. For some locations there may be several recommendations. A location where a pedestal type signal is to be changed to corner post type signal units should be marked in both columns, "Complete Removal - Signals" and "New Installation - Signals - Corner Post Units." Such double marking applies in a similar manner to all recommendations involving both complete removal and new installation. The markings in each case, of course, are to be made in the columns that apply. The last column on the right is used for recording the number of the drawing (Figure 3) that shows the recommendations in detail.

H. Mapping Obstructions and Recommendations

All the locations where obstructions are to be treated should be spotted on a large street layout map as shown in Figure 4, page 38. The completed Summary of Recommendations Form, TO-3, should be used as the source of information for this map. Such a map will give the geographical

SURVEY OF TRAFFIC OBSTRUCTIONS

Form TO-3

SUMMARY OF RECOMMENDATIONS

WPA Project No 65421

Date April 3, 1939

LOCATION	COMPLETE REMOVAL						RELOCATION														NEW INSTALLATION						PAINTING									Drawing No.
	Sign	Mushroom Guide Button	Island	Curb Riser	Signal		Sign	Signal	Pole	Police Call Box	Fire Alarm Box	Signal Control Box	Mailbox	Waste Receptacle	Newspaper or Magazine Stand	Hawker Stand	Police Semaphore Signal	Officer's Platform	Bus or Street-car Stop		Stop Sign	Caution Sign	Other Sign	Signals-Corner Post Units	Island		Center Line	Crosswalks	Mushroom Buttons	Diagonal Stripes		Corner Curb Cutback	Illumination	Trim Tree Branches			
Benton, Gale & Market		X																													X					11
Carcaran & Standard																						X							X							10
Dale, Market & 20th														X													X				X					8
Dale & 22nd																						X					X									5
Jefferson St. (2100 block)																							X				X			X						1
Lief & 22nd																						X					X									7
Lief & 23rd		X												X													X				X					6
Maine & 21st		X																																		—

AF-3030, WPA

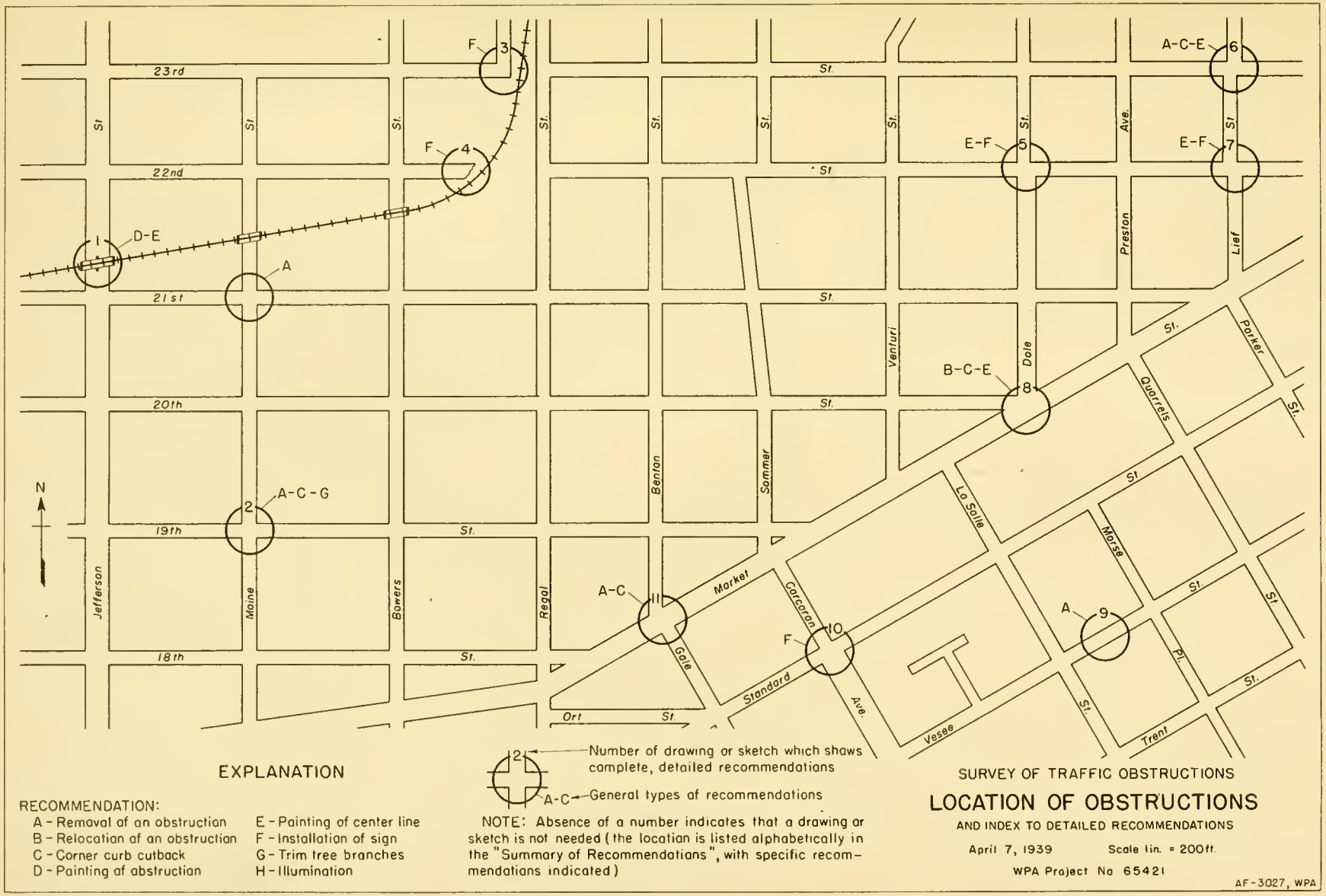

23rd
22nd
21st
20th
19th
18th
St
Jefferson
Moine
Bowers
Regal
Benton
Sommer
Venturi
Dole
Preston
Lief
Parker
Quarrels
La Salle
Morse
Market
Carcoran
Gale
Standard
Ave.
Ort
Vesee
Trent
Pl.
N
1 D-E
2 A-C-G
3 F
4 F
5 E-F
6 A-C-E
7 E-F
8 B-C-E
9 A
10 F
11 A-C
EXPLANATION
RECOMMENDATION:
A - Removal of an obstruction
B - Relocation of an obstruction
C - Corner curb cutback
D - Painting of abstruction
E - Painting of center line
F - Installation of sign
G - Trim tree branches
H - Illumination
2 Number of drawing or sketch which shows complete, detailed recommendations
A-C General types of recommendations
NOTE: Absence of a number indicates that a drawing or sketch is not needed (the location is listed alphabetically in the "Summary of Recommendations", with specific recommendations indicated)
SURVEY OF TRAFFIC OBSTRUCTIONS
LOCATION OF OBSTRUCTIONS
AND INDEX TO DETAILED RECOMMENDATIONS
April 7, 1939 Scale 1in. = 200ft.
WPA Project No 65421
AF-3027, WPA

FIGURE 4

distribution of recommendations, which should prove convenient in scheduling the work of carrying out the recommendations. The map should include a title that describes clearly the nature of the map, the area it covers, and other identifying data such as date, scale, etc. As suggested in Figure 4, the map should contain an explanation of the symbols that are used. The types of recommendations identified in the explanation in Figure 4 are general, but should be adequate for the purpose. A list of more specific types of recommendations would be too long in most cases, but if local conditions permit, such a list may be used.

I. Writing the Report

The report ordinarily should not be voluminous. It should contain a brief statement of how the survey was conducted, what was considered, and the area covered. It should include a summary of the work each governmental agency is to perform in the program of elimination and treatment of obstructions. Recommendations for cutting back corner curbs and for converting pedestal type signals and warning beacons to corner post type units should be listed in the order of the urgency for doing the work, as suggested on pages 24, 25, and 29.

The report should include general recommendations of policy in regard to certain types of obstructions now existing and the treatment of future roadway constructions and traffic control installations to prevent delays, inconvenience and inefficiency in traffic movement, and to reduce hazards to vehicles and pedestrians to a minimum. Such general recommendations of future policy in regard to new constructions and installations should deal with stop-and-go signals, corner curb radii, curb height,

open drains across roadways, illumination of obstructions, and standards for signs, signals, islands, and roadway markings.

The appendix of the report should include the drawings for the detailed recommendations and also a brief description of the recommended standard treatment for different types of situations and obstructions.

(Continued from inside of front cover)

LOW INCOME HOUSING AREA SURVEY *
Technique for securing and tabulating data on composition, income, and expenditures for household facilities of families living in dwelling units found to be substandard.

AN OUTLINE OF SURVEYS IN THE FIELD OF REAL PROPERTY AND HOUSING *
Suggestions for a coordinated program of real property and housing surveys.

INDEX OF RESEARCH AND STATISTICAL DATA
A circular offering suggestions for compiling an inventory of available research and statistical material.

INSTALLATION OF COMPREHENSIVE PERSONNEL SERVICE RECORDS
Procedure for installing and maintaining records of important facts concerning the services of employees of governmental agencies.

DEFINITION OF POLICE BEATS
Procedure for making a study of uniformed patrolmen throughout a municipality to attain a maximum of protection to persons and property with the available force.

INSTALLATION OF A SINGLE FINGERPRINT FILE
Technique for the installation of a single fingerprint file, using the Battley system of classification.

INDEXING VITAL STATISTICS CERTIFICATES
Technique for making a cross-index file by names to original vital statistics certificates; for preparing the temporary alphabetic card index file; and for converting the temporary card file into a permanent ledger index.

SURVEY OF TRAFFIC OBSTRUCTIONS
Technique for locating and recording obstructions to vehicular and pedestrian traffic, with suggestions for making improvements.

* Prepared by the WPA Division of Research. All others prepared by the WPA Division of Professional and Service Projects (formerly the Division of Women's and Professional Projects.)

JUN 15 1967